Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
Interference Immunity Performance	)	ET Docket No. 03-65
Specifications for Radio Receivers	)	
	)	
Review of the Commission's Rules	)	MM Docket No. 00-39
and Policies Affecting the Conversion to	)	
Digital Television	)	

COMMENTS OF INTERSIL CORPORATION

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COMMENTS OF INTERSIL CORPORATION

Intersil Corporation ("Intersil") files these comments in the above-captioned proceeding.[1] Intersil is a manufacturer of complete wireless LAN chipsets. Worldwide sales for wireless LAN chipsets in 2002 were 22-24 million radios (most sold in the U.S.), expected to double in 2003.

The present comments apply only to receiver standards for unlicenced devices under Part 15 of the Commission's Rules. Intersil takes no position on standards for other categories of equipment.

A. The Imposition of Receiver Standards Raises Serious Risks of Adverse, Unintended Consequences.

In principle, receiver standards make sense. The Commission is correct in observing that better receiver design can reduce interference and improve spectrum efficiency.[2] Yet, in 68 years of regulation, the Commission has focused almost exclusively on transmitters, regulating such interference-related characteristics as power, bandwidth, modulation, location, and antenna

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[1] *Interference Immunity Performance Specifications for Radio Receivers*, ET Docket No. 03-65, Notice of Inquiry, FCC 03-54 (released March 13, 2003) (Notice).

[2] Notice at para. 10.

height. There has been almost no attention to receivers.[3] Despite its one-sided nature, this approach has provided a stable and predictable environment for manufacturers and users alike, while still allowing scope for the dramatic technological innovations that emerged over the last few decades. In practice, the model of regulating transmitters and ignoring receivers has worked well.

Intersil is concerned about the very real possibility of unintended consequences emerging from receiver standards. For example, the Commission seeks comment on

> new approaches that focus on the actual RF environment and interaction between transmitters and receivers, such as the interference temperature metric. Such new approaches would better allow the Commission to anticipate and enable future users of the spectrum while providing a greater degree of certainty to incumbents regarding the RF environment they will continue to operate in.[4]

There can be no arguing with the goal of admitting more users while giving certainty to incumbents. But the approach expressed here rests on a world view that does not square with our experience as a manufacturer of unlicensed equipment. There is no static "actual RF environment." To the contrary, the RF environment is highly dynamic both locally and macroscopically. The 2.4 GHz unlicensed band is a good example. Despite high noise levels and unpredictable characteristics, it is a band of choice for technological innovation. Locally, however, it is impossible to anticipate the number, type, and proximity of potential interference sources in the band. There are simply too many devices of too many different kinds, ranging from narrowband cordless phones to large industrial RF heaters. And, on a macroscopic level, it

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[3] Notice at para. 5.

[4] Notice at para. 9 (footnotes omitted).

is inevitably true that any successful technology, by its own proliferation, will change its own operating environment. Thus, providing certainty to incumbents would have the perverse effect of penalizing new and successful services that change the environment.

In addition, we foresee practical problems in specifying, testing, and enforcing receiver standards. Some of these are illustrated in the history of the former "processing gain" requirement for certain spread spectrum receivers. We briefly review that history in Part B, below.

Even without regulation, industry has implemented measures of the types described in the Notice. For example, IEEE 802.11 WLAN Standards have requirements for Adjacent Channel Interference immunity.[5] And, as the Commission suggests in the Notice, IEEE 802.11 equipment automatically reduces data rate as one means of increasing reliability in the presence of radio interference.[6] Market forces already encourage manufacturers to address the Commission's goals of producing interference-tolerant, spectrum-efficient receivers.

The Commission has rarely subjected receivers to technical requirements (other than unintentional emissions), and then only for the most compelling reasons of public policy.[7] We know of only one receiver requirement intended to limit received interference: the rule that the bandwidth of a frequency-hopping spread spectrum receiver must match the transmitter and hop

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[5] *See* Notice at para. 12.

[6] Notice at para. 13.

[7] Examples include scanning radios (prohibiting access to cellular frequencies), and consumer TV receivers (requiring all-channel tuning, V-chip capability, and closed captioning). *See* 47 C.F.R. Secs. 15.117, 15.120, 15.121, and 15.122.

in synchrony with the transmitter.[8] The Commission adopted this rule out of concern that manufacturers might cut costs by offering a frequency-hopping transmitter paired with a non-hopping "wide open" receiver that simply monitored the entire band, thus exploiting the relatively high power allowed for spread spectrum without achieving its benefits.[9] Yet even this isolated instance of receiver regulation is unnecessary in practice. Considering the intense use of the spread spectrum bands in which the rule applies, a wide open receiver would take in far too much interference to be useful. Here, as in many cases, the market makes a good substitute for regulation.

Adopting receiver standards would also fly in the face of an ongoing Commission effort to minimize regulations that encumber manufacturers and users. The stunning success of unlicensed services such as Wi-Fi has established the wisdom of this philosophy. By making spectrum readily available under reasonable and well-understood equipment regulations, the Commission enabled millions of consumers to set up wireless Internet access and networking in their homes and businesses at very low cost. We doubt that adding layers of receiver standards would have accelerated the dramatic performance improvements and price reductions of the last several years. If anything, the extra costs and uncertainties would have been more likely to hamper dynamic development.

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[8] 47 C.F.R. Sec. 15.247(a)(1).

[9] *Spread Spectrum Systems*, 5 FCC Rcd 4123 at para. 27 (1990).

B. Processing Gain: A Case Study

One of the Commission's rare forays into receiver regulation began in 1990, with the adoption of a requirement for processing gain in direct sequence spread spectrum receivers.[10] The aim was to ensure that a spread spectrum system actually "spreads" its signal, and to provide a measure of the system's resistance to interference.[11] At the time, a test of these criteria was entirely reasonable, and a measure of processing gain looked like a suitable assessment. But complexities soon arose that could not have been foreseeable.

The Commission originally wanted manufacturers to measure processing gain by comparing signal-to-noise ratios with the spreading turned on and off.[12] The test proved difficult to implement, and some manufacturers argued it held back the performance of systems that otherwise complied in full with the rules. In particular, some manufacturers found they could not satisfy the processing gain test without reducing the data rate. But that increased the duration of transmissions -- which meant the requirement increased (rather than decreased) the probability of interference, creating another example of unintended consequences.

Several manufacturers asked for waivers of the processing gain measurement procedure. In 1995 the Commission announced it would permit an alternative CW jamming margin test.[13]

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[10] *Id*. at paras. 13-17

[11] *Id*.

[12] 47 C.F.R. Sec. 15.247(e) (1996).

[13] *Guidance on Measurements for Direct Sequence Spread Spectrum Systems*, Public Notice (released July 12, 1995).

The Commission incorporated the CW test into the rules in 1997.[14] But it intensified the debate two years later by proposing a Gaussian jamming margin test in addition to (or instead of) the CW test.[15] The result was a furor of comments on measurement technique. Some argued that a Gaussian test could bar updates to products that had been extremely successful in the market, including 802.11b. Other comments disputed any utility of processing gain as a measure of interference resistance. In the end, the Commission terminated twelve years of contention by dropping the requirement altogether.[16]

The same order also opened new options for modulations at frequencies and powers previously limited to spread spectrum.[17] Industry promptly responded by developing the IEEE 802.11g standard, offering peak data rates of up to 54 Mbps -- nearly five times faster than equipment under the previous rules. The market response has been dramatic. Within six months of introduction, equipment based on 802.11g became the top selling wireless LAN platform.

In short, regulatory flexibility leads to good products. Any advantages of regulating receivers may not be worth the possible drag on innovation, and the ever-present risk of unintended consequences.

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[14] *Spread Spectrum Transmitters*, 12 FCC Rcd 7488 at paras. 44-45 (1997).

[15] *Spread Spectrum Devices*, 14 FCC Rcd 13046 at paras. 14 (1999) (Notice of Proposed Rule Making).

[16] *Spread Spectrum Devices*, 17 FCC Rcd 10755 at paras. 17-21 (2002).

[17] *Id*. at paras. 7-16.

C. The Commission May Lack the Statutory Authority to Establish Receiver Standards.

The Commission has only the powers that Congress gives it by statute. The Notice expresses the Commission's confidence that it has the authority needed to regulate receivers.[18] The Commission asked for comment on this issue, and we agree it needs more attention.

As bases for its authority, the Commission cites Sections 4(i), 301, 302a(a), and 303(e), (f), and (r) of the Communications Act.[19] Each of these, except for Section 302a(a), is very general in scope. We agree that receiver regulation is a reasonable means of addressing some of the goals Congress has assigned the Commission. And, were it not for Section 302a(a), we would agree that receiver regulation comes within the Commission's authority.

But Section 302a(a)(2) raises a problem. It provides:

> The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations
>
> [. . .]
>
> (2) establishing minimum performance standards for home electronic equipment and systems to reduce their susceptibility to interference from radio frequency energy. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, or shipment of such devices and home electronic equipment and systems, and to the use of such devices.[20]

This provision gives the Commission exactly the authority in question -- to regulate receivers "to reduce their susceptibility to interference" -- but it limits that authority to home electronic equipment and systems, such as AM/FM radios and TV receivers.

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[18] Notice at para. 22.

[19] *Id.*

[20] 47 U.S.C. Sec. 302a(a).

This is an obstacle to regulation of other types of receivers. The principle of statutory interpretation known as *expressio unius est exclusio alterius* means that "[g]enerally, the inclusion of certain terms in a statute implies the exclusion of others."[21] At least one case in the U.S. Court of Appeals for D.C. Circuit takes the principle farther: by failing to mention an item, Congress effectively declares that item to be outside the statute.[22] This amounts to saying that Congress has forbidden the Commission to regulate any receivers other than those in home electronics.

On the other hand, an earlier case in the same circuit would set aside this principle in administrative cases where it leads to a reading inconsistent with the agency's:

> [R]eliance on the *expressio unius* maxim -- that the expression of one is the exclusion of others -- is misplaced. The maxim has little force in the administrative setting, where we defer to an agency's interpretation of a statute unless Congress has directly spoken to the precise question at issue.[23]

Thus, under *Mobile Communications*, the court might uphold a reading of the Communications Act that authorized the regulation of receivers generally. Or, alternatively, it might limit the *Mobile Communications* case to its facts, where the agency faced conflicting congressional

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[21] *Moldo v. Matsco*, 252 F.3d 1039, 1053 (9th Cir. 2001), *cert. denied*, 534 U.S. 1130 (2002).

[22] "A statute listing the things it does cover exempts, by omission, the things it does not list. As to the items omitted, it is a mistake to say that Congress has been silent. Congress has spoken -- these are matters outside the scope of the statute." *The Original Honey Baked Ham Co. v. Glickman*, 172 F.3d 885, 887 (D.C. Cir. 1999).

[23] *Mobile Communications Corp. v. FCC,* 77 F.3d 1399, 1404-05 (D.C. Cir. 1995) (internal quotation marks and citations omitted), *cert. denied*, 519 U.S. 823 (1996).

mandates and the item excluded from the statute was arguably not of the same kind or character as those mentioned.[24]

In short, we think the law on this question warrants a thorough analysis.

CONCLUSION

At first glance, receiver standards look like an effective way to increase spectrum efficiency. But in the context of unlicensed Part 15 operation, the risk of deterring innovation, along with the risks of unintended consequences, may outweigh any benefits. The sparse history of receiver regulation, particularly the requirement on processing gain, shows the difficulty of implementing effective rules. And the lawfulness of such rules is open to question. We urge the Commission to move cautiously.

Respectfully submitted,

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[24] Statutory provisions raised in the case allow the Commission to charge administrative fees in connection with licensing, and to conduct auctions. A party argued that those grants exclude the power to impose a discounted charge, in lieu of auction payment, on the holder of a "pioneer's preference" granted before the Commission received auction authority. *Id*.

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